IN THE CLAIMS

In this amendment, claims 1-31 are pending. Claims 1-3, 5-7, 9-13, 24, 27, 28 and 31 are amended. Claims 64-74 are added. The status of all claims is provided below.

1. (currently amended) A process of making a device for conducting unit operations on a fluid comprising:

stacking a plurality of shims such that a continuous flow path is formed through the shims;

wherein the flow path extends in a direction substantially parallel to shim thickness;

wherein the plurality of shims comprises at least three adjacent shims through which ~~a~~ the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least three shims;

wherein the three shims are configured such that a unit operation can be performed on a fluid in the flow path; and

bonding the shims to form a device capable of performing a unit operation on a fluid.

2. (currently amended) The process of claim 1 wherein the flow path is formed by an aperture in each of the at least three adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises a shape ~~comprise at least one aperture~~ selected from the group consisting of: circles, triangles, waves, ovals, irregular shapes and rectangles or squares or triangles with rounded corners.

3. (currently amended) The process of claim 2 wherein the flow path is formed by an aperture in each of the at least three

adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises a shape ~~comprise at least one aperture~~ selected from the group consisting of: circles and triangles; and

wherein the at least three shims are bonded to form a device comprising a ~~channel~~ flow path having a cylindrical or prismatic shape.

4. (original) The process of claim 1 wherein each of the at least 3 adjacent shims is identical.

5. (Currently amended) The process ~~method~~ of claim 1 further comprising the step of placing a catalyst or sorbent in said flow path.

6. (Currently amended) The process ~~method~~ of claim 1 wherein the flow path in said at least three shims does not mix with any other flow paths.

7. (Currently amended) The process ~~method~~ of claim 1 further comprising the step of placing a static mixer in said flow path.

8. (original) A device formed by the method of claim 1.

9. (Currently amended) A process of conducting a unit operation comprising the step of passing a fluid through the flow path formed in said at least three adjacent shims of the device of claim 8 and conducting the unit operation on the fluid in the flow path formed in said at least three adjacent shims.

10. (Currently amended) A process of making a device from a

plurality of shims, passing a fluid through said device and conducting a unit operation on the fluid, comprising:

stacking a plurality of shims such that a continuous flow path is formed through the shims;

wherein the flow path is substantially parallel to shim thickness;

wherein the plurality of shims comprises at least three shims through which ~~a~~ the flow path is formed and wherein a straight, unobstructed line is present through the flow path in said at least three shims;

wherein the flow path in said at least three shims does not mix with any other flow paths;

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing a fluid into the device such that a fluid passes through the flow path in said at least three shims; and

performing at least one unit operation on the fluid as it passes through the flow path in said at least three shims.

11. (Currently amended) The process of claim 10 wherein the flow path formed in said at least 3 shims is defined by ~~the~~ borders of apertures in said at least 3 shims, and wherein, in each of said at least 3 shims there is a border of said borders of apertures in said at least 3 shims defining ~~a~~ the flow path, the border having a circumference and wherein said circumference in each shim is at least 20% populated by edge features.

12. (Currently amended) The process of claim 10 wherein the flow path formed in said at least 3 shims is defined by the borders of apertures in said at least 3 shims, and wherein, in at least one of said at least 3 shims there is a border of said

borders of apertures in said at least 3 shims defining ~~a~~ the flow path, the border having a circumference and wherein said circumference in each shim is at least 20% populated by edge features, and wherein in another of said at least 3 shims there is a border defining ~~a~~ the flow path, and the border in said another of said at least 3 shims is smooth.

13. (Currently amended) A process of conducting a unit operation on a fluid, comprising:

stacking a plurality of shims such that a continuous flow path is formed through the shims;

wherein the flow path is substantially parallel to shim thickness;

wherein the plurality of shims comprises at least three shims through which ~~a~~ the flow path is formed and a straight, unobstructed line is present through the flow path in said at least three shims;

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing a fluid into the device such that the fluid passes through the flow path in said at least three shims; and

performing at least one unit operation on the fluid as it passes through the flow path in said at least three shims.

14. (original) The process of claim 13 wherein the device is capable of performing at least one unit operation selected from the group consisting of: vaporization, compression, chemical separation, distillation, reaction and condensation.

15. (original) The process of claim 13 wherein the flow path in said at least three shims does not mix with any other flow paths.

16. (original) The process of claim 13 wherein said fluid comprises at least a portion of a reaction composition; and

further comprising a second fluid that passes through a second flow path in said at least three shims.

17. (original) The process of claim 16 wherein the fluid in said flow path and the second fluid in said second flow path do not mix.

18. (original) The process of claim 17 wherein the fluid in said flow path and the second fluid in said second flow path in said at least three shims are separated by a distance of 5 mm or less and wherein the pressure in said flow path and the second flow path differ by at least 1 atm.

19. (original) The process of claim 18 wherein the pressure in said flow path and the second flow path differ by at least 10 atm.

20. (original) The process of claim 18 wherein the fluid in said flow path and the second fluid in said second flow path in said at least three shims are separated by a distance of 1 mm or less and wherein the pressure in said flow path and the second flow path differ by at least 19 atm.

21. (original) The process of claim 17 wherein the fluid in the second flow path is a heat exchange fluid.

22. (original) The process of claim 18 wherein the flow path comprises first supports that extend across the flow path, and

the second flow path comprises second supports that extend across the second flow path; and

wherein the first supports and the second supports are staggered.

23. (original) The process of claim 17 wherein the second fluid comprises a second reaction composition;

wherein the reaction composition reacts exothermically; and

wherein the second reaction composition reacts endothermically.

24. (Currently amended) A process of conducting a unit operation on a fluid, comprising:

stacking a plurality of shims such that a continuous flow path is formed through the shims;

wherein the flow path is substantially parallel to shim thickness;

wherein the plurality of shims comprises at least three shims through which ~~a~~ the flow path is formed and wherein the flow path in said at least three shims has a minimum dimension (height or width) of at least 10 μm;

bonding the shims to form a device capable of performing a unit operation on a fluid;

passing a fluid into the device such that the fluid passes through the flow path in said at least three shims; and

performing at least one unit operation on the fluid as it passes through the flow path in said at least three shims.

25. (original) The process of claim 24 wherein the unit operation is selected from the group consisting of: chemical reaction, vaporization, compression, chemical separation,

distillation, condensation, heating, and cooling.

26. (original) The process of claim 24 wherein the flow path has a maximum dimension (height or width) of at most 5000 μm.

27. (Currently amended) A process of making a device from a plurality of shims, passing a fluid through said device and conducting a unit operation on the fluid, comprising:

stacking a plurality of shims such that a continuous flow path is formed through the shims;

wherein the flow path is substantially parallel to shim thickness;

bonding the shims to form a device capable of performing a unit operation on a fluid;

~~wherein the unit operation is selected from the group consisting of distilling, reacting, adsorbing, heating, cooling, compressing, expanding, separating, absorbing, vaporizing, condensing, and combinations of these;~~

passing a fluid into the device such that the fluid passes through the flow path in said plurality of shims; and

performing at least one unit operation on the fluid as it passes through the flow path in said plurality of shims;

wherein the unit operation is selected from the group consisting of distilling, reacting, adsorbing, heating, cooling, compressing, expanding, separating, absorbing, vaporizing, condensing, and combinations of these.

28. (Currently amended) The process of claim 27 wherein the plurality of shims comprises at least three shims through which ~~a~~ the flow path is formed and wherein a straight line can be drawn through the flow path in said at least three shims.

29. (original) The process of claim 28 wherein the device is capable of at least two different unit operations.

30. (original) The process of 29 wherein there is a second flow path adjacent to said flow path and wherein a heat transfer fluid flows through said second flow path.

31. (Currently amended) The process of claim 29 wherein the at least two different unit operations comprise heating ~~heat transfer~~ and ~~chemical reaction~~ reacting, and further wherein ~~there~~ said heating comprises combustion ~~is~~ occurring in said flow path and said reacting comprises a steam reforming reaction ~~is~~ occurring in the second flow path.

32-63. (canceled).

64. (new) A microchannel device, comprising:
a microchannel wherein a microchannel wall or walls completely enclose the microchannel in directions perpendicular to flow;
wherein the microchannel wall or walls comprise edge features that cause at least a 0.1% variation in the diameter of the microchannel; and
wherein the edge features populate at least 50% of the circumference of the microchannel.

65. (new) The microchannel device of claim 64 wherein the microchannel wall or walls comprise edge features that cause at least a 1% variation in the diameter of the microchannel.

66. (new) The microchannel device of claim 65, wherein at least 90% of a circumference of the microchannel is populated by edge

features.

67. (new) The microchannel device of claim 64, wherein the edge features have a cross-sectional shape selected from the group of: squares, rectangles, and triangles.

68. (new) The microchannel device of claim 64, comprising edge features that have a base (attached to the microchannel wall) that have a cross-sectional diameter that is smaller than the cross-sectional diameter of a part of the edge features that protrudes from the microchannel wall.

69. (new) The microchannel device of claim 64, wherein the edge features project at least 5% of the distance across a diameter of the microchannel.

68. (new) The microchannel device of claim 64, wherein the microchannel comprises a mixing insert having the shape of a: helix, double helix, spiral, or alternating spirals.

69. (new) The microchannel device of claim 64 wherein the microchannel is a first microchannel and further comprising a second microchannel that is adjacent to the first microchannel and whose shape conforms to that of the first microchannel.

70. (new) The microchannel device of claim 64 wherein the microchannel wall or walls, including the edge features, are made of a nonporous material.

71. (new) The microchannel device of claim 70 wherein the nonporous material is metal.

72. (new) A process of fluid processing in a microchannel, comprising:
passing a fluid into the microchannel in the microchannel device of claim 64, and processing the fluid in the microchannel.

73. (new) The process of claim 72 wherein the step of processing the fluid comprises mixing.

74. (new) The process of claim 72 wherein the step of processing the fluid comprises performing a unit operation.

75. (new) The process of claim 1 wherein the flow path is formed by an aperture in each of the at least three adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises a shape selected from the group consisting of: waves and irregular shapes.

76. (new) The process of claim 13 wherein the device is capable of performing at least one unit operation selected from the group consisting of: compression, chemical separation, distillation, and condensation.

77. (new) The process of claim 24 wherein the unit operation is selected from the group consisting of: vaporization, compression, chemical separation, distillation, and condensation.

78. (new) The process of claim 1 wherein the flow path is formed by an aperture in each of the at least three adjacent shims and wherein the aperture in each of the at least three adjacent shims comprises rectangles or squares or triangles with

rounded corners.

79. (new) The process of claim 7 wherein the mixer comprises a structure comprising a helical pattern, double helical pattern, spiral pattern, or alternating spiral pattern.

80. (new) The process of claim 28 wherein there is a second flow path adjacent to said flow path and wherein each of the flow path and the second flow path contain a catalyst and wherein the catalyst in the second catalyst is different from the catalyst in said flow path.

81. (new) The process of claim 80 wherein an exothermic reaction is conducted in said flow and an endothermic reaction is conducted in the second flow path.

82. (new) The process of claim 27 wherein the flow path comprises a metal film.

83. (new) The process of claim 28 wherein the flow path comprises a metal film.

84. (new) The process of claim 28 wherein the flow path comprises a catalyst metal on an oxide support.

85. (new) The process of claim 13 wherein the plurality of shims comprises at least five shims through which the flow path is formed and a straight, unobstructed line is present through the flow path in said at least five shims; and comprising

passing a fluid into the device such that the fluid passes through the flow path in said at least five shims; and

performing at least one unit operation on the fluid as it passes through the flow path in said at least five shims.